WHAT IS CLAIMED IS:

1. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine, comprising the steps of: generating plasma in the exhaust gas discharged from the lean burn engine and containing the particulate material, to thereby produce a plurality of $O(^1D)$ radicals and subsequently produce a plurality of per-hydroxide excited species; and oxidizing the particulate material by the per-hydroxide excited species.

2. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 1, wherein, in plasma generating conditions, an intensity E of an electric field is set at a value equal to or larger than 3.0 kV/mm, and a power density Dw is set at a value equal to or larger than 1 W/cm^3.

3. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 1 or 2, wherein the surface of at least one of opposed electrodes which is opposed to the other electrode is covered with a dielectric.

4. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like and comprising a carbon solid fraction and a soluble organic fraction covering the carbon solid fraction, the process

comprising the steps of: subjecting the soluble organic fraction to the reaction with oxygen under the presence of a catalyst to oxidize the soluble organic fraction; generating plasma in the exhaust gas to produce plasma excited species; and oxidizing the carbon solid fraction by the plasma excited species.

5. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 4, wherein the catalyst is at least one selected from the group consisting of Pt, Pd, Rh, Cu Ag and Au.

6. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 4 or 5, wherein, in plasma generating conditions, an intensity E of electric field is set at a value equal to or larger than 3.0 kV/mm, and a power density Dw is set at a value equal to or larger than 1 W/cm^3.

7. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 4, 5 or 6, wherein the surface of at least one of opposed electrodes which is opposed to the other electrode is covered with a dielectric.

8. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or

the like, comprising the steps of: generating plasma in the exhaust gas discharged from the lean burn engine and containing the particulate material to produce a plurality of nitrogen dioxide molecules and a plurality of ozone molecules; and oxidizing the particulate material by the nitrogen dioxide molecules and the ozone molecules.

9. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine, comprising the steps of: generating plasma in the exhaust gas discharged from the lean burn engine and containing the particulate material to produce a plurality of nitrogen dioxide molecules and a plurality of ozone molecules; oxidizing the particulate material by the nitrogen dioxide molecules and the ozone molecules; and subjecting the particulate material to the reaction with the nitrogen dioxide molecules and the ozone molecules in the presence of a catalyst to oxidize the particulate material.

10. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 9, wherein the catalyst is at least one selected from the group consisting of Pt, Pd, Rh, Cu Ag and Au.

11. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 8, 9 or 10, wherein, in plasma

generating conditions, an intensity E of electric field is set at a value equal to or larger than 3.0 kV/mm, and a power density Dw is set at a value equal to or larger than 1 W/cm^3.

12. A process for decreasing the content of a particulate material contained in an exhaust gas from a lean burn engine or the like according to claim 8, 9, 10 or 11, wherein the surface of at least one of opposed electrodes which is opposed to the other electrode is covered with a dielectric.